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F2Y YTA Y104 Y3112
U1S S2107 S2208 S2284 S2424

(56) Documents Cited
GB 2255430 A GB 2205941 A GB 1475886 A
GB 1006457 A EP 0171747 A2 US 4852055 A

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(54) Input apparatus

(57) An input apparatus for controlling a display device by using the screen display of the display device comprises: cursor moving means 5, VR1, VR2 for moving the position of a cursor on the screen of the display device; switching means 9 which is provided in conjunction with the cursor moving means; and a controller for controlling at least the on/off operations of the input apparatus.

Fig. 1A

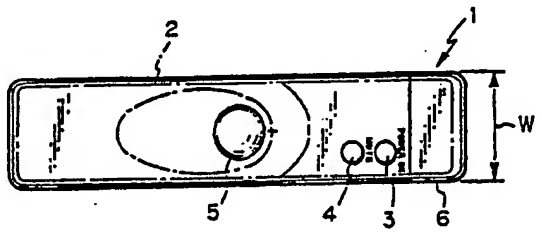

Fig. 3

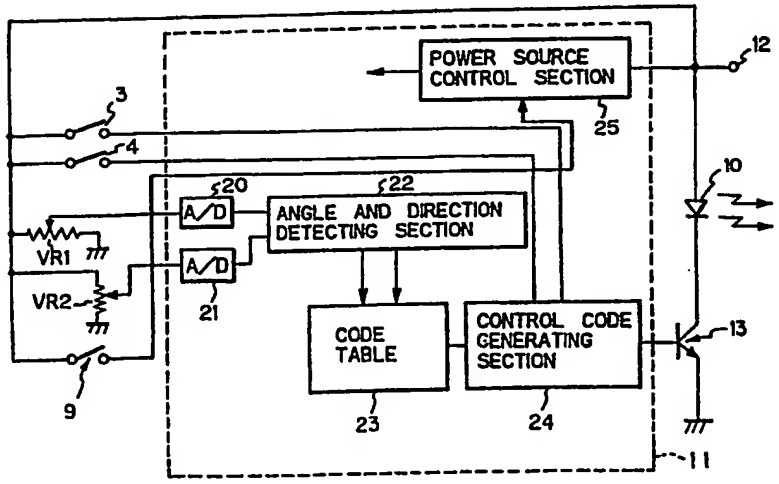

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Fig. 1A

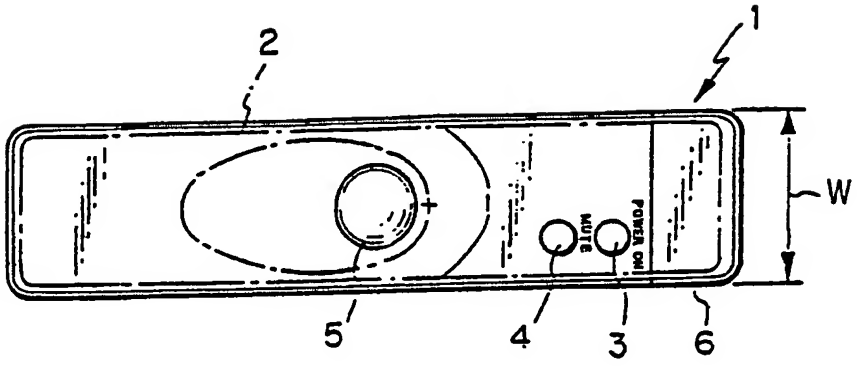


Fig. 1B

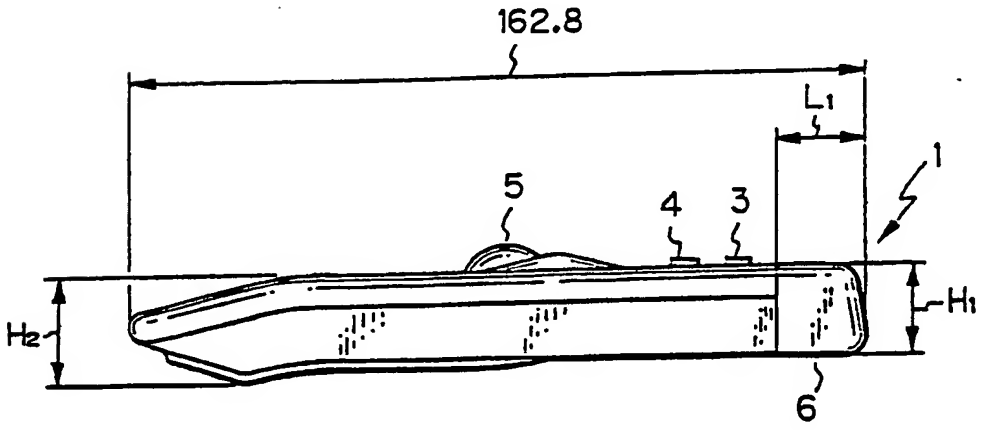


Fig. 2A

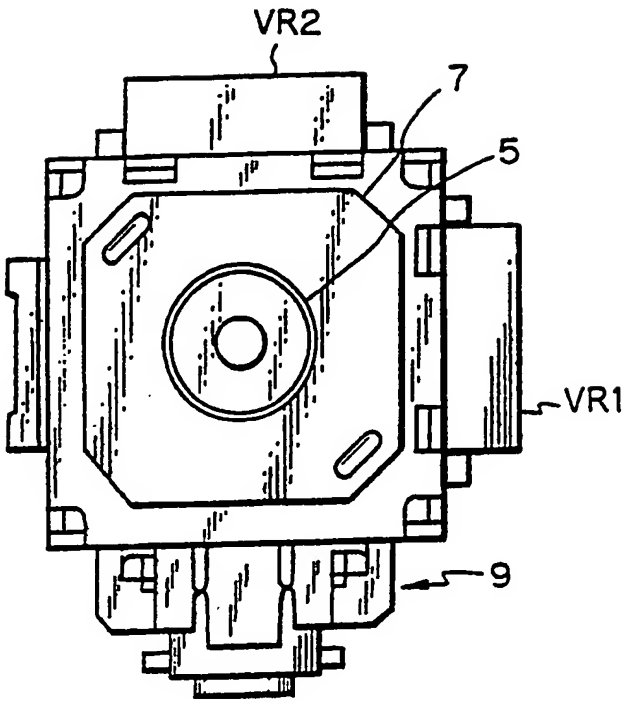


Fig. 2B

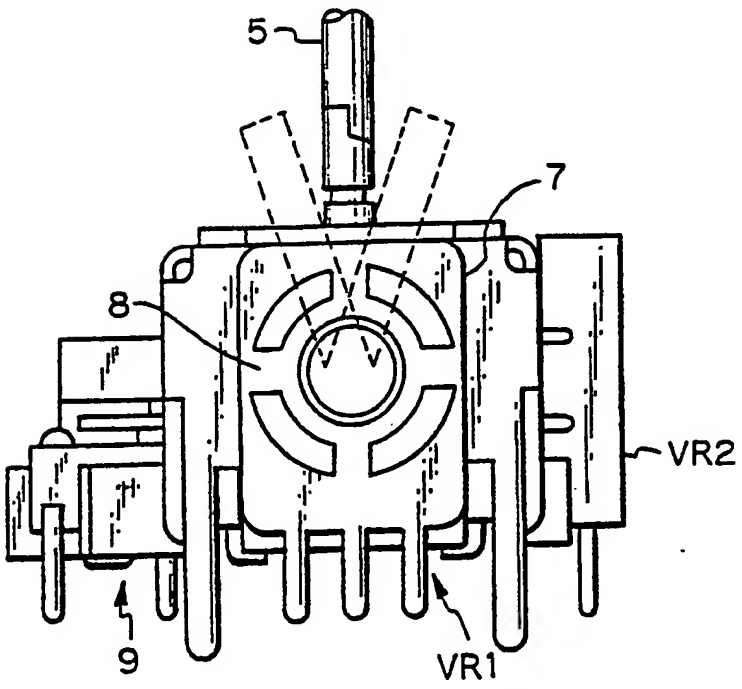
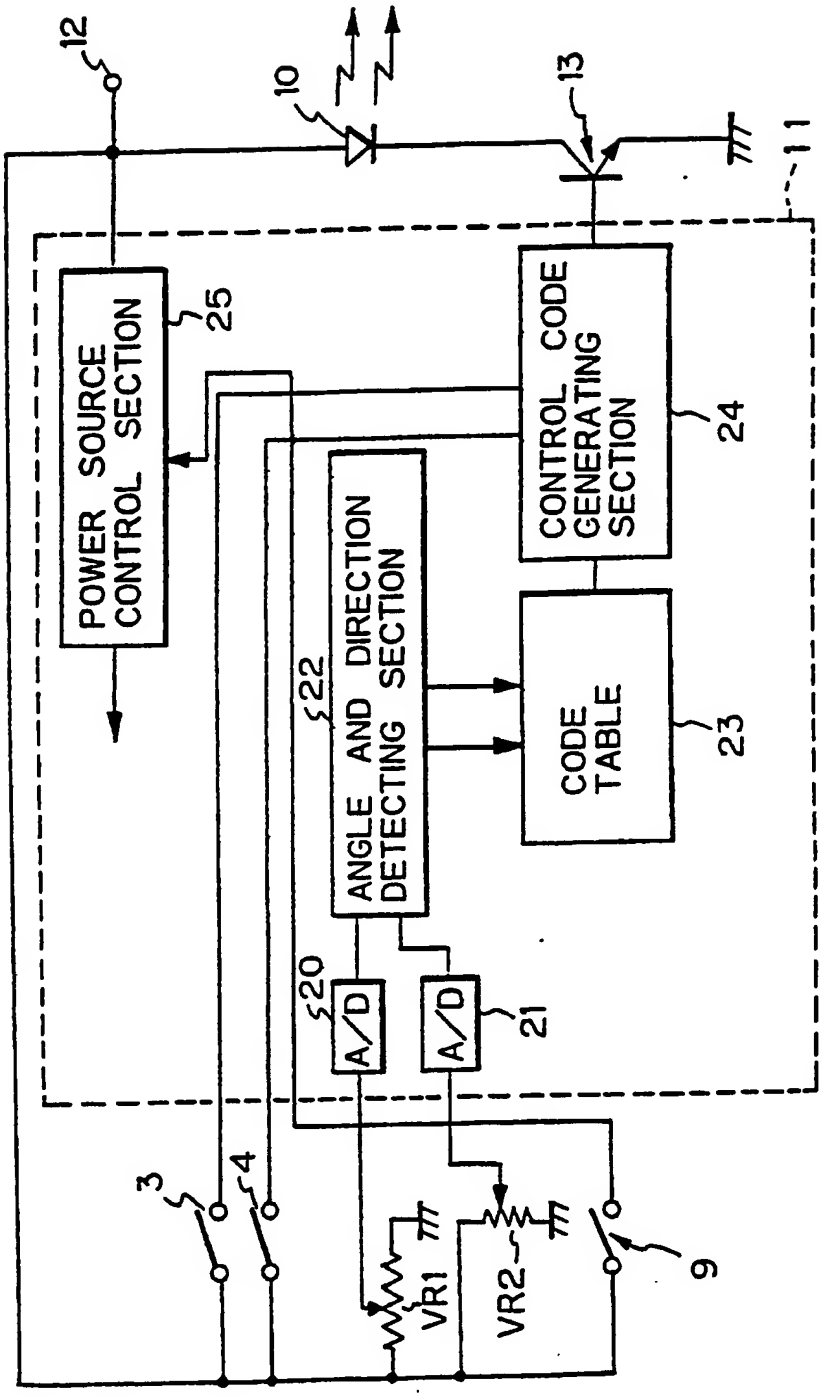


Fig. 3


12
10
13
11
POWER SOURCE CONTROL SECTION
25
CONTROL CODE GENERATING SECTION
24
ANGLE AND DIRECTION DETECTING SECTION
22
CODE TABLE
23
20
A/D
A/D
21
3
4
VR1
VR2
9

415

Fig. 4

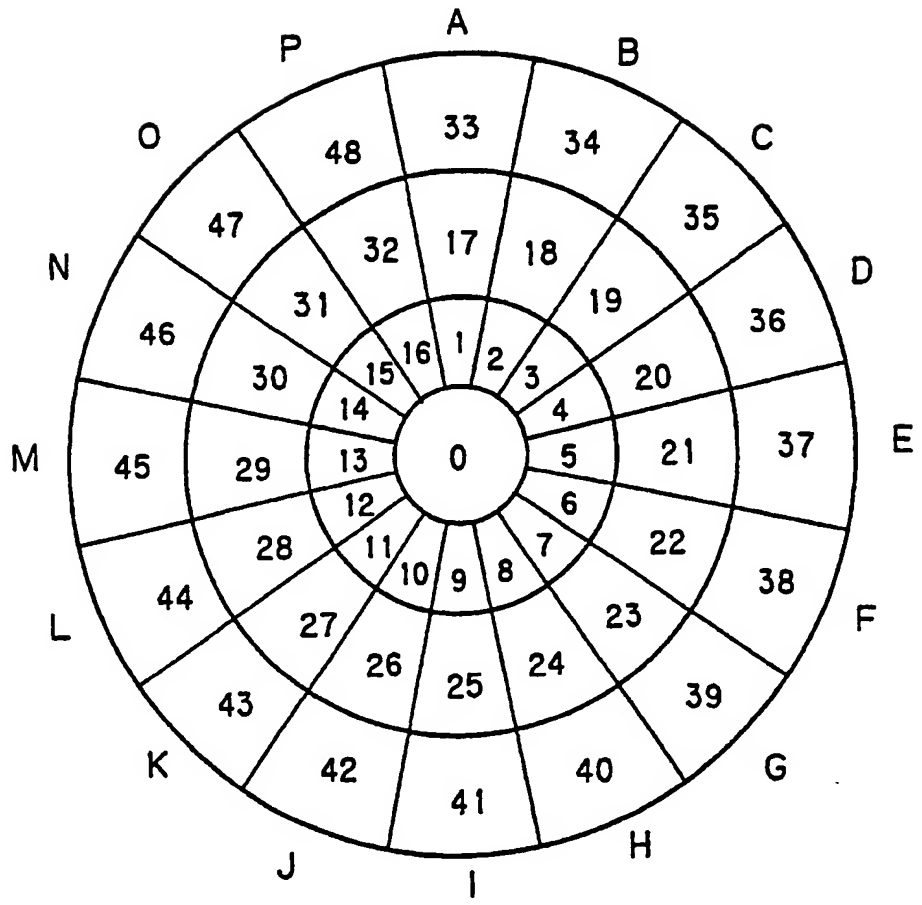

A
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Fig. 5

VECTOR DIRECTION	VECTOR AMOUNT (VOLTAGE V)			
	0~0.7	0.7~1.3	1.3~1.9	1.9~2.5
A	0	1	17	33
B	0	2	18	34
C	0	3	19	35
D	0	4	20	36
E	0	5	21	37
F	0	6	22	38
G	0	7	23	39
H	0	8	24	40
I	0	9	25	41
J	0	10	26	42
K	0	11	27	43
L	0	12	28	44
M	0	13	29	45
N	0	14	30	46
O	0	15	31	47
P	0	16	32	48

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"INPUT APPARATUS"

The present invention relates to an input apparatus such as a remote commander or the like which is convenient for use for a TV or a tape recorder.

In a TV, tape recorder, and the like, an input apparatus such as a remote commander or the like which can execute a remote control is used. In case of using the remote commander, for example, when a control signal is transmitted from the remote commander to the display device such as a CRT or the like, a cursor and an icon of a plurality of function keys are displayed on the screen of the display device. The cursor is moved onto a desired icon by the user and is decided by a decision key or the like, so that the function corresponding to the icon is executed. From the remote commander, a control signal for vertically or laterally moving the cursor, a control signal for executing the function corresponding to the icon, and the like are transmitted to the display device.

Remote commanders having the following construction are known. For example, there is a remote commander having a construction in which a plurality of keys such as on/off key of a power source, menu key, decision key, volume control key, and the like are arranged. In this remote commander, when a desired key is pressed, a controller provided in the remote commander is activated and the code corresponding to the pressed key is generated. Infrared rays are modulated according to the code thus generated and irradiated onto the display device. After that, the operation of the remote commander is automatically stopped. In such a remote commander, when a predetermined key is pressed, the circuit is automatically activated.

However, in the remote commander in which a plurality of keys are arranged, the user must operate many keys, so that a movement amount of fingers in the operation is inevitably large. Therefore, there is a difficulty in operating efficiency.

There is also known a remote commander having a construction using, for example, a joystick as an operator. In this remote commander, when the joystick is moved, a voltage which is applied to a controller provided in the remote commander is changed. The voltage is sent to a display device. As such an input apparatus, for instance, an apparatus disclosed in Japanese Patent Application No Hei 03-242454 is known.

In the remote commander using the joystick, the voltage which is supplied from an internal variable resistor to the controller is applied to an A/D conversion input terminal of the controller. Due to this, it is impossible to activate automatically the remote commander. Such a remote commander can operate either by having a main body activated by pressing a menu key or the like arranged independently, or when the user grasps a remote commander its state is detected and the remote commander is activated, or the like. However, in the above methods, since such a key or detecting circuit must be newly provided, it causes problems with respect to simplification of the operation, the miniaturisation of the apparatus, and the like. Further, in case of stopping the remote commander, the key must be operated again. In the case where such an operation is not performed, the battery of the remote commander is consumed in vain.

It is, therefore, an object of the invention to provide an input apparatus in which the apparatus itself can be activated and stopped by a minimum construction and

the vain electric power consumption can be prevented.

According to an aspect of the invention, there is provided an input apparatus for controlling a display device by using the screen display of the display device comprising:

cursor moving means for moving the position of a cursor on the screen of the display device;

switching means which is provided in conjunction with the cursor moving means; and

a controller for controlling at least the on/off operations of the input apparatus.

The invention can be used with a remote commander which includes a rotatable operating member.

The present invention will be further described by way of non-limitative example in the following detailed description, with reference to the accompanying drawings, in which:-

Figures 1A and 1B are top view and side view of a remote commander;

Figures 2A and 2B are perspective views of an operator and its peripheral portions;

Figure 3 is a circuit diagram of the remote commander;

Figure 4 is a schematic diagram showing a code definition of control codes; and

Figure 5 is a code tape of the control codes.

An embodiment of the invention will be described hereinbelow, with reference to the drawings.

In Figures 1A and 1B, a top view and a side view in the case where an input apparatus according to the invention is embodied as a remote commander are shown. Figure 1A is a top view of the remote commander.

Referring to Fig. 1A, a power on/off key 3 to control the on/off operations of the power source and a mute key 4 to mute an audio sound are arranged in the front portion of an operating surface 2 of the remote commander 1. In almost the central portion of the operating surface 2, an operator (joystick or the like) 5 in which only one of the tip portions is projected to the outside is provided. The other tip portion of the operator 5 is axially supported in the remote commander 1. The tip portion of the operating surface 2 is a control signal output section 6 to transmit a control code by infrared rays to a display device such as a TV.

Fig. 1B is the side view of the remote commander 1. As will be understood from Fig. 1B, the power on/off key 3, mute key 4, and operator 5 are constructed integratedly with the remote commander 1 main body, so that the external view is not unsightly. With respect to the dimensions of the remote commander 1, for example, a size W in the lateral direction is set to 42 mm, a size L in the depth direction is set to 184.7 mm, a length L_1 of the control signal output section 6 is set to 21.9mm, a height H_1 is set to 21.6 mm, and a height H_2 is set to 27mm.

Figs. 2A and 2B are perspective views of the operator 5 and its peripheral portions. In Fig. 2A, a perspective view in the case where it is seen from the

upper portion is shown. In Fig. 2B, a perspective view in the case where it is seen from the side is shown. Referring to Fig. 2A, another tip portion of the operator 5 is connected to an engaging portion 8 (not shown) of an almost square casing 7 in the remote commander 1. The operator 5 is rotatable around the other tip portion as an axis. A variable resistor VR1 is arranged on the first side of the casing 7, a variable resistor VR2 is arranged on the second side, and a switching circuit 9 is arranged on the third side facing the second side, respectively.

The switching circuit 9 is connected to a controller. For example, by depressing the operator 5 perpendicularly to the casing 7, the controller is activated. Due to this, the remote commander is set into the operating state. Since the controller can be activated by the operator 5 mentioned above, a key for activating the controller is unnecessary. By depressing the operator 5, an icon is automatically displayed on the screen of the display device. Further, when a state in which the remote commander is not operated in a predetermined period of time is continued, the controller is automatically turned off. Thus, it is prevented that an electric power is vainly consumed.

Referring to Fig. 2B, the operator 5 can incline the casing 7 by up to 80° from a state in which the operator 5 is perpendicular to the first side (neutral state). Each of the variable resistors VR1 and VR2 is

used to detect the position information (comprising angle information indicative of a degree of inclination of the operator 5 and direction information) of the operator 5. Namely, on the casing 7, the variable resistor VR1 is used as a detector in the vertical direction of the operator 5, the variable resistor VR2 is used as a detector in the horizontal direction of the operator 5, and the position information of the operator 5 can be detected.

In Fig. 3, a circuit diagram of the remote commander 1 mentioned above is shown. The circuit in Fig. 3 comprises a key input section (power on/off key 3 and mute key 4), the variable resistors VR1 and VR2, the switching circuit 9, and an LED 10 and a controller 11 for generating a control code for infrared rays. One end portion of the key input section, one end portion of the resistor of the variable resistor VR1, one end portion of the resistor of the variable resistor VR2, and one end portion of the switching circuit 9 are mutually connected. The other end portion of the key input section is connected to the controller 11. The other end portion of the resistors of the variable resistors VR1 and VR2 are connected to the ground. The variable resistors VR1 and VR2 are connected to an A/D input terminal of the controller 11. In the case where the operator 5 is moved, resistance values of the variable resistors VR1 and VR2 are changed and the resultant values are supplied to the

controller 11 as voltage values corresponding to new resistance values.

A power source voltage is supplied from a power source input terminal 12 to the controller 11. The anode side of the LED 10 is connected to the terminal 12. The cathode side of the LED 10 is connected to a collector of a transistor 13. A base of the transistor 13 is connected to the controller 11 and an emitter is connected to the ground.

The controller 11 comprises: A/D converters 20 and 21 which are supplied with voltages from movable terminals of the variable resistors VR1 and VR2; an angle and direction detecting section 22 which is supplied with outputs of the A/D converters 20 and 21; a control code table 23; a control code generating section 24; and a power source control section 25 for supplying a power to each block of the controller which is controlled by the switch circuit 9. The angle and direction detecting section 22 detects the direction information and angle information of the operator 5 by the detection voltages of the variable resistors VR1 and VR2. The detected informations are converted into a predetermined control code by the control code table 23. The control code table 23 is constructed by a ROM memory, gate array, or the like. Each function of the angle and direction detecting section 22, control code table 23 and control code generating section 24 may be effected by a microcomputer.

When the circuit of the remote commander 1 shown in Fig. 3 operates, the switch circuit 9 is first turned on by depressing the operator. Due to this, the controller 11 is activated and a control code indicative of displaying the icon of the function key on the screen of the display device is transmitted. Then, the icon of the function key is displayed on the screen of the display device. Subsequently, when the operator 5 is moved, the position information in the horizontal direction is detected by the variable resistor VR1 and the position information in the vertical direction is detected by the variable resistor VR2, respectively. A voltage which is generated from each of the variable resistors VR1 and VR2 is supplied to the controller 11. The controller 11 selects a predetermined control code from the two supplied voltages. The transistor 13 is turned on simultaneously with the selection of the control code, thereby transmitting the selected control code from the LED 10 to the display device. The cursor on the screen of the display device is moved to a position according to the control code.

In Fig. 4, in order to move the cursor on the screen of the display device, the code definition of the control 8 code which is selected by the controller 11 is shown. According to the code definition shown in Fig. 4, the control codes of 0 to 48 are allocated and the vector

directions of A to P are allocated. The control codes comprise levels of three stages. The first level is set to the control codes 1 to 16, the second level is set to the control codes 17 to 32, and the third level is set to the control codes 33 to 48. The control code 0 is used when the operator 5 exists at the position in the neutral state.

When the control code at the first level is generated, the moving speed of the cursor on the screen is 7 set to a low speed. When the control code at the second level is generated, the moving speed is set to a middle speed, and when the control code at the third level is generated, the moving speed is set to a high speed, respectively. By variably changing the moving speed of the cursor on the basis of the control code level mentioned above, the cursor can be moved at a high speed in the case where the moving distance of the cursor is long and the cursor can be moved at a low speed when the moving distance of the cursor is short. A range of the vector direction of each level can be made different. Namely, by narrowing the ranges of the vector direction of the first and third levels and by widening the range of the vector direction of the second level, the operator 5 is moved to the innermost rim when setting to the first level, to the outermost rim when setting to the third level, and to a position other than the innermost and outermost rims when setting to the second level.

Therefore, the operating efficiency can be improved.

In order to detect to which one of the codes 1 to 48 the operator 5 was moved, the variable resistors VR1 and VR2 are used. That is, as mentioned above, the position information in the vertical direction of the operator 5 is detected by the variable resistor VR1, the position information in the horizontal direction of the operator 5 is detected by the variable resistor VR2, respectively. An output voltage of each of the variable resistors VR1 and VR2 is supplied to the controller 11. In the controller 11, those output voltages are read and the codes according to the voltage value is generated.

In Fig. 5, a code table for selecting the control code is shown. In the code table, two kinds of detection items regarding the operator 5 are provided. One of them is 'vector direction' (direction information) and the other is 'vector amount' (angle information). The code table is used in each of the vertical and horizontal directions, separately.

When the operator 5 is in the neutral state, a voltage in a range of $0(V) \leq V < 0.7(V)$ is supplied to the controller 11. When the operator 5 is moved within a range of the first level (1 to 16), a voltage in a range of $0.7(V) \leq V < 1.3(V)$ is supplied to the controller 11. When the operator 5 is moved within a range of the second level (17 to 32), a voltage in a range of $1.3(V) \leq V < 1.9$

(V)is supplied to the controller 11. When the operator 5 is moved in a range of the third level (33 to 48), a voltage in a range of $1.9(V) \leq V < 2.5(V)$ is supplied to the controller 11. The range of each voltage mentioned above is an example and each voltage range can be varied.

The relation between the control code and the cursor on the screen will now be described hereinbelow by using the code table. For example, when the operator 5 is inclined in the vector direction C, the operator 5 can be set to either one of the control code 3, 19, and 35. In this instance, in the case where the control code 3 is selected, the voltage in a range of $0(V) \leq V < 0.7(V)$ is supplied from the variable resistors VR1 and VR2 to the controller 11. Since the control code 3 belongs to the first level, the cursor is moved in the screen at a low speed. Similarly, in the case where the control code 19 is selected, a voltage in a range of $0.7(V) \leq V < 1.3(V)$, or in the case where the control code 35 is selected, a voltage in a range of $1.9(V) \leq V < 2.5(V)$ is supplied from the variable resistors VR1 and VR2 to the controller 11, respectively. Since the control code 19 belongs to the second level, the cursor is moved in the screen at a middle speed. Since the control code 35 belongs to the third level, the cursor is moved in the screen at a high speed.

Having described a specific preferred embodiment of the present invention with reference to the

accompanying drawings, it is to be understood that the invention is not limited to that precise embodiment, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or the spirit of the invention as defined in the appended claims.

According to the invention, since the remote commander can be activated by depressing the operator, it is unnecessary to provide a circuit for detecting that the operator grasps a key for activation or the remote commander. Therefore, the movement amount of fingers can be reduced and the circuit can be miniaturized. In the case where the operator is not operated in a predetermined period of time, since the remote commander is automatically turned off, it is possible to prevent that an electric power is vainly consumed.

CLAIMS

1. An input apparatus for controlling a display device by using the screen display of the display device comprising:

cursor moving means for moving the position of a cursor on the screen of the display device;

switching means which is provided in conjunction with said cursor moving means; and

a controller for controlling at least the on/off operations of said input apparatus.

2. The input apparatus according to claim 1, wherein a control code to display an icon on the screen of the display device is generated by operating said switching means.

3. The input apparatus according to claim 1 or 2, wherein in the case where when said cursor moving means is not operated in a predetermined period of time, said controller is automatically turned off.

4. The input apparatus according to claim 1, 2 or 3, wherein said cursor moving means comprises means for generating a cursor moving control code to move said cursor on the basis of angle information and direction information when said cursor moving means is operated.

5. The input apparatus according to claim 4, wherein said cursor moving means comprises means for generating a cursor moving control code indicative of cursor moving speed on the basis of said angle information when said cursor moving means is operated.

6. The input apparatus according to any one of the preceding claims, wherein said cursor moving means comprises:

an operator;

first variable resistor means for performing detection in the vertical direction of said operator; and

second variable resistor means for performing detection in the horizontal direction of said operator,

the power source of said input apparatus being controlled by said switching means according to a movement in the vertical direction of said operator.

7. The input apparatus according to claim 6, wherein said controller comprises:

first and second A/D converters which are supplied with outputs of said first and second variable resistor means;

detecting means for detecting an angle and direction of said operator according to outputs of said first and second A/D converters;

code table means for converting the angle information and direction information from said detecting means into a control code;

control code generating means for generating a control code according to an output of said code table means; and

means for transmitting generated control code.

8. Input apparatus constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 — 17 —
(The Search report)

Application number
GB 9405168.7

Relevant Technical Fields

(i) UK Cl (Ed.M) G4H (HRBE, HRBH, HRBS, HRE, HSU, HSV, HX) F2Y (YTA, YTB)

(ii) Int Cl (Ed.5) G08C

Search Examiner
M J DAVIS

Date of completion of Search
13 APRIL 1994

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
1-8

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

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P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2255430 A	(SAMSUNG) whole document	1 at least
X	GB 2205941 A	(IBM) whole document	1 at least
X	GB 1475886	(SECRETARY OF STATE) whole document	1 at least
X	GB 1006457	(BULL) whole document	1 at least
X	EP 0171747 A2	(METAPHOR COMPUTER) whole document	1 at least
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